South West Slopes Forestry Hub

Socio-economic impacts of the softwood plantation industry

South West Slopes Forestry Hub Region, NSW and Vic

Summary Report, May 2020

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Executive Summary

In July 2019 the South West Slopes Regional Forest Industry Hub was launched, as part of the Australian Government's 'Billion Trees' initiative. The Hub encompasses the South West Slopes region around Tumut and Tumbarumba, extending down into north east Victoria. This is referred to in this report as the 'the South West Slopes Forestry Hub region'. This short report provides an overview of employment, economic value, and key skills needs of the softwood plantation industry in the South West Slopes Forestry Hub region. The report is based on data collected in 2016 and 2017 and reflects the softwood plantation industry in the region as at that time. A significant bushfire spread throughout the region in the summer of 2019-2020, impacting on a significant area of softwood plantations.

In 2015-16, the gross value of final output from the industry up to and including primary processing was $1,277 million, and $2,580 million when flow-on effects to other industries are included. Contribution to Gross Regional Production (GRP) (or the 'value-added' to the economy excluding transfers between industries) in the region was $1,163 million, including $624 million from flow-on effects. The industry is thus a significant component of the regional economy. The direct net expenditure of the industry (the amount spent by the industry, rather than the sales value of its output), was $954 million in 2015-16. Of this total expenditure, almost 80% was contributed by the wood and paper processing sector. The largest single component of expenditure for the industry overall was wages and salaries, with $212 million injected directly into the regional economy via household incomes. Including flow-on effects, the total contribution of the industry to household income in the region was $559 million in 2015-16.

As of February 2017, the industry directly employed 2,487 people in the region (up to and including primary processing), and 2,638 people dependent on the region, with 63% of these generated by primary wood and paper processing. When flow-on effects of the industry on other industries are included, the direct and flow-on employment generated by the South West Slopes Forestry Hub softwood plantation industry provided jobs for a total of 7,067 people within the region, and for 7,799 people across NSW and Victoria as a whole, in early 2017.

As the softwood industry evolves, there is growing demand for workers with specialised skills. A need to have a skilled machine operator workforce and to have professionals with high level engineering, forestry, financial, middle management and information and communication technology (ICT) skills remains strong. Businesses also commonly reported a need for workers with generalised skills in occupational health and safety training, and business and financial management. Registered training organisations were commonly used by businesses to provide training in forest operations planning and management, machinery operation, occupational health and safety, road transport, and business and financial management.

Recruiting skilled managers and professional staff, finance managers and heavy machinery operators is difficult for many businesses in the region, suggesting a critical need to address the challenges that are causing a lack of skilled staff. These challenges include a lack of suitably skilled local workers, the high cost of in-house training of staff, and difficulty attracting skilled workers from elsewhere to live in the region.

1. Introduction

Study background

In 2018, two separate reports outlining the socio-economic impacts of the forest industry in (i) the South West Slopes (including Bombala) region of NSW, and (ii) the north east Victoria region were produced by University of Canberra and BDO Econsearch, funded by Forest and Wood Products Australia. Additional funding for the NSW South West Slopes region was provided by the NSW Department of Industry, Economic, Skills and Regional Development. A detailed description about the forest industry in these regions can be found in these reports (Schirmer et al. 2018a & 2018b). In July 2019 the South West Slopes Regional Forest Industry Hub was launched, which encompasses most of the NSW South West Slopes region examined in Schirmer et al. (2018a) around Tumut and Tumbarumba (excluding the Bombala area), and extending down into north east Victoria (referred to in this report as the 'the South West Slopes Forestry Hub region') (Figure 1).

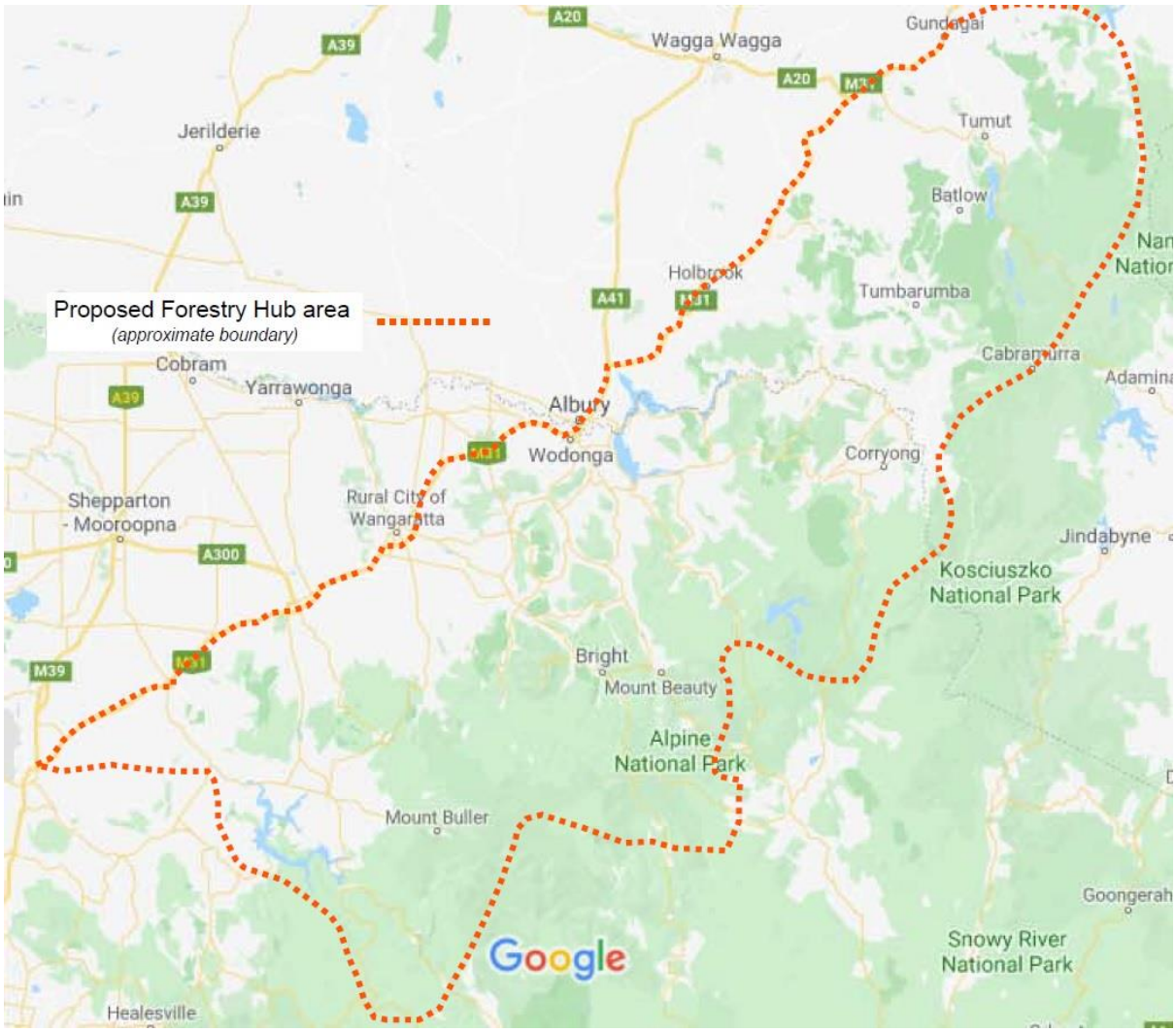

Figure 1 South West Slopes Forestry Hub region (approximate boundary)

The South West Slopes Forestry Hub region has been identified as having significant competitive advantages in forestry, including large areas of plantation, integrated transport and processing infrastructure as well as a skilled forestry workforce with supportive local governments. The funding commitment to the Hub is intended to assist the regional industry to identify constraints acting to limit industry expansion, and taking action to minimise such constraints. The Hub will develop plans to enable progress on establishing new plantations, planning new infrastructure investment and manufacturing innovative new products (AFPA 2019). The region includes the local government areas of Albury City, City of Wagga Wagga, Cootamundra-Gundagai Regional Council (formerly the Shires of Cootamundra and Gundagai), Greater Hume Shire, and Snowy Valleys Council (formerly the Shires of Tumut and Tumbarumba) in New South Wales (NSW), and Alpine Shire Council, Benalla Rural City Council, Indigo Shire Council, Mansfield Shire Council, Strathbogie Shire Council, Towong Shire Council, Wangaratta Rural City Council and Wodonga Council in north east Victoria. Processors include pulp and paper mills, sawmills, particleboard and plywood production, and most recently the cross laminated timber manufacturing plant by XLam (opened in March 2018 – excluded from the estimates in this report).

Within this Hub region, a large estate of approximately 175,000 hectares (ha) of softwood plantations (reported by softwood plantation businesses in the region) supplies considerable amounts of fibre annually to several wood and paper processors, supporting significant employment in several towns.

The study

This short report provides data on employment, economic value, and key skills needs of the softwood plantation industry in the South West Slopes Forestry Hub region. It examines:

- The economic value of the industry, including direct and flow-on economic activity generated by the industry
- The employment generated by the softwood plantations and primary wood and paper processing facilities located in the South West Slopes Forestry Hub region of NSW and north east Victoria up to and including primary processing, including the direct and indirect employment generated by the growing, harvesting, haulage, processing, and distribution of finished products
- Skills and training needs of the industry

Data sources and methods

In 2017, all businesses involved in the growing, managing, harvesting, transporting or processing of commercial wood or paper products in the region were asked to take part in a survey. Originally these data were reported in two separate reports, one for a region encompassing the NSW part of the South West Slopes Forestry Hub region, together with the Bombala region (Schirmer et al. 2018a); and one covering most of Victoria (Schirmer et al. 2018b), including the north east region that forms part of the South West Slopes Forestry Hub region. The datasets gathered for these two reports were re-analysed to produce data specific to the South West Slopes Forestry Hub region. A total of 74 businesses were identified as operating in the industry in the region (including nurseries, plantation management agencies/companies, silvicultural contractors, harvest and haulage contractors, and wood and paper processors).

Appendix 1 provides more detailed information on the survey process and responses achieved. Data from the survey were analysed to identify the direct employment and economic activity generated by the industry and skills and training needs. They then informed economic input-output modelling using BDO EconSearch's RISE model, which identified flow-on employment and economic activity generated by the industry in the South West Slopes Forestry Hub region.

Study scope

The South West Slopes Forestry Hub plantation industry has a supply chain with three distinct parts. In the first two parts – primary production and primary processing - plantations are grown and harvested (primary production), and logs are processed into primary products such as sawntimber, woodchips, pulp and paper (primary processing). In primary production and primary processing the jobs generated depend on establishment and growing of plantations and harvest of wood from plantations grown in the region. These 'primary' products are then either sold directly into end-use markets, for example into industries such as construction; or are sold for further processing into 'secondary' products by other processors such as trusses, cross-laminated timber (CLT) or engineered timber products (ETPs). This can occur both inside and outside the region. In the third part of the supply chain, the 'secondary processing' sector, those primary wood and fibre products sold for further processing are further processed into a range of products (for example, cabinets, furniture, and paper packaging products). While some manufacturing facilities in the region engage in both primary and secondary processing of plantation roundwood (and are included in this study), most are primary processors, and there is limited secondary processing in the region. While some secondary processors are located within the region, most secondary processing of primary products produced in the region occurs in other locations such as Sydney.

This report examines the primary production and primary processing parts of the softwood plantation industry in the region. It does not examine secondary processing in detail, as the small number of jobs generated by secondary processing do not necessarily utilise timber from the softwood plantations in the region. In a small number of cases, secondary processing is included where the processing takes place on the same site as the primary processing of roundwood.

Report structure

This short report includes data for the South West Slopes Forestry Hub region, with the following sections:

- Economic value and expenditure impacts of the industry (Chapter 2)
- Employment generated by the industry (Chapter 3)
- Industry skills and training needs (Chapter 4)

2. Economic value of the industry

The softwood plantation industry in the South West Slopes Forestry Hub region of New South Wales (NSW) and Victoria represents a significant part of Australia's total softwood plantation estate and associated processing. The 175,000 ha hectares of softwood plantation established in the region make up 16.9% of Australia's total of 1,035,400 hectares of softwood plantations as of 2016 (ABARES 2016). Multiple wood and paper processors operate in the region, ensuring the logs harvested from these plantations undergo considerable 'value-adding' prior to finished products being sent to domestic and international wholesale and retail markets. This study included all primary processors in the region (some of which also undertake secondary processing activities).

The economic value of an industry can be estimated using a range of different measures. One common measure is the value of final gross output, defined as the sale value of the products produced by the industry at the end point of sale (excluding sales of products or services occurring at earlier points in the supply chain to avoid double counting). The direct gross output of the South West Slopes Forestry Hub region was $1,277 million in 2015-16.

Another common economic value measure used is the total net expenditure of the industry in the region, after taking into account transfers between different parts of the industry. This figure is less than total value of output as it measures what is spent by the industry rather than the sale value of output. Direct net expenditure is a useful measure of the amount the industry contributes to the local economy, as it excludes transfers of profits to head companies located outside the region.

In total, in 2015-16, the local industry generated $954 million in direct net expenditure as a result of investment in growing, harvesting, log haulage and processing of wood and paper products in the region. Table 1 summarises expenditure generated at different stages of growing (silviculture, nurseries, road construction and other services reported separately), harvest and processing. It then shows expenditure net of transfers within the industry – this net figure ensures there is no double counting by ensuring that payments made from one part of the industry to another (and then expended in that other part of the industry) are not included. The transfers excluded from this net figure include payments made to harvest, haulage, roading, earthworks and silvicultural contractors by plantation managers, and payments made to plantation managers or to other processors for fibre inputs used by wood and paper processors.

Table 1 Direct expenditure generated by the South West Slopes Forestry Hub plantation industry, 2015-16, by supply chain stage

Supply chain stage	Gross total expenditure in 2015-16 ($m)	Net expenditure excluding transfers to other plantation sectors ($m)
Establishing & growing plantations	210.3	50.7
Harvest & haulage of logs to processors	120.8	120.8
Primary wood and paper processing	1,070.8	748.1
Nurseries, silvicultural and roading	26.0	26.0
Other (including consulting, equipment sales, training)	3.5	3.5
TOTAL	N/A (includes 'double counting' if summed)	**953.9**

Businesses in the industry were asked to identify key expenditure items, including spending on inputs and supplies, wages and salaries, and other key items. This was further analysed through use of input-output modelling (see Appendix 1 for details). Table 2 summarises the total spend across the industry on key items. Wages and salaries account for around 22% of total industry expenditure, and is the largest single item of expenses recorded by the industry survey.

Table 2 Expenditure of the South West Slopes Forestry Hub plantation industry, 2015-16, by industry sector

Expenditure within the South West Slopes Forestry Hub region	Value ($m)	Proportion of total (%)
Wages/Salaries	211.5	22%
Electricity, Gas, Water and Waste Services	93.2	10%
Rental, Hiring and Real Estate Services	85.1	9%
Manufacturing	73.2	8%
Wholesale Trade	45.9	5%
Communication	25.9	3%
Other Services	24.2	3%
Transport, Postal and Warehousing	23.6	2%
Agriculture	18.5	2%
Public Administration and Safety	15.2	2%
Financial and Insurance Services	14.2	1%
Accommodation and Food Services	13.1	1%
Professional, Scientific and Technical Services	11.8	1%
Other	7.7	1%
Education and Training	7.1	1%
Administrative and Support Services	6.9	1%
Construction	6.4	1%
Retail trade	5.8	1%
Sub-total	**689.3**	**72%**
Expenditure outside the South West Slopes region	264.6	28%
Total	**953.9**	**100%**

Table 3 identifies the economic contribution of the South West Slopes Forestry Hub softwood plantation industry, by sector, including total value of output, contribution to Gross Regional Product (GRP), and contribution to household income. The industry generated a total of $2,580 million of gross value of output for the region in 2015-16, including $1,303 million from flow-on effects. Contribution to GRP (or the 'value-added' to the economy) in the region was $1,163 million, including $624 million from flow-on effects.

The largest single component of expenditure for the industry overall was wages and salaries, with $212 million injected directly into the regional economy via household incomes. Including flow-on effects, the total contribution of the industry to household income in the region was $559 million in 2015-16.

The idea of 'flow-on' impacts can often seem intangible. In reality, these flow-on effects involve the generation of economic activity in many businesses that have a high level of dependence on the presence of the plantation industry, and whose survival relies on its presence. An example of this is a small business supplying specialty parts to the forest and other industries that was established in the

region originally to supply the forest industry, and has since expanded into supplying to other industries over time. The business remains very dependent on the forest industry, with any downturn in the industry having a significant impact on their business. As a supply business, the employment and economic activity generated in this business is considered a 'flow-on' effect of the industry, and they are an example of the many businesses on which the success of the industry depends.

Table 3 Economic contribution of the South West Slopes Forestry Hub plantation industry, by sector – value of output, Gross Regional Product, and household income, 2015-16

	Growers (forest management companies)	Primary wood and paper processing	Harvest & haulage contracting businesses	Other (including consultants, equipment sales, training)	Nurseries, silvicultural & roading contracting businesses	Whole Industry (excludes transfers)[1]
Output ($m)	**369.5**	**2,347.4**	**275.5**	**8.8**	**60.7**	**2,579.7**
Direct ($m)	305.3	1,293.2	127.7	4.0	29.1	1,277.1
Production-induced ($m)	29.4	650.0	74.6	2.3	15.8	772.2
Consumption-induced ($m)	34.8	404.1	73.1	2.6	15.8	530.5
Gross Regional Product ($m)	**144.9**	**873.7**	**114.0**	**4.2**	**26.2**	**1,163.0**
Direct ($m)	112.7	374.4	40.4	1.6	10.4	539.5
Production-induced ($m)	13.2	278.7	33.6	1.1	7.2	333.8
Consumption-induced ($m)	19.0	220.7	40.0	1.4	8.7	289.7
Household Income ($m)	**36.1**	**426.9**	**76.6**	**2.7**	**16.5**	**558.8**
Direct ($m)	17.7	151.9	33.5	1.2	7.3	211.5
Production-induced ($m)	9.0	166.7	23.3	0.8	5.0	204.8
Consumption-induced ($m)	9.4	108.4	19.7	0.7	4.3	142.5

[1] The direct output totals for the whole industry excludes transfers between industry sectors, ensuring no double counting of payments made from one part of the industry to another (then expended in that other part of the industry).

The contribution of the industry to the economy of New South Wales and Victoria is larger than its contribution to the South West Slopes Forestry Hub region, and the contribution to Australia is larger again. The main reason for this is that flow-on effects for New South Wales and Victoria include expenditures made outside of the region by businesses in the South West Slopes. Some examples of these expenditures are fuel, communication services, some wood inputs to processors and other services. The contribution of the South West Slopes Forestry Hub softwood plantation industry to the economy of New South Wales and Victoria in 2015-16 was approximately $1,334 million in GRP and $629 million in household income, each including flow-on effects (see Appendix 1).

Conclusions

The contribution of the softwood plantation industry to the GRP of the South West Slopes Forestry Hub region in 2015-16 was $1,163 million, including flow-on effects. It thus adds significant value to the regional economy. The direct net expenditure of the industry (the amount spent by the industry, rather than the sales value of its output), was $954 million in 2015-16. Of this total expenditure, almost 80% was contributed by the primary wood and paper processing sector.

The largest single component of expenditure for the industry overall was wages and salaries, with $212 million injected directly into the regional economy via household incomes in 2015-16. When the flow-on effects of this are included, the total contribution of the industry on household income in the region was $559 million.

The contribution of the South West Slopes Forestry Hub softwood plantation industry to the economy of New South Wales and Victoria in 2015-16 was around $1,334 million in GRP and $629 million in household income, each including flow-on effects.

4. Employment generated by the industry

The softwood plantations located in the South West Slopes Forestry Hub region generate a large number of jobs in businesses ranging from nurseries growing seedlings and silvicultural contractors preparing ground for plantings, through to harvest and haulage of logs to processors, and processing of logs and residues into wood and paper products. Most of these jobs (93%) are located within the region, largely due to the establishment of multiple wood and paper processing facilities in the region. As well as generating employment locally, the jobs of some people living in other regions depend on the softwood plantations in the South West Slopes Forestry Hub region.

The employment generated by the softwood industry in the South West Slopes Forestry Hub region up to and including primary processing is detailed in this section, focusing on:

- The total number of direct and indirect jobs generated by the industry as of February 2017
- Jobs generated at different points in the supply chain
- Jobs generated in different local government areas (LGAs)

Direct and indirect employment – February 2017

The South West Slopes Forestry Hub softwood plantation industry generated a total of 2,638 direct jobs up to and including primary processing as of February 2017. This includes all jobs up to and including primary processing located within the region that depend on the softwood plantation industry, as well as those jobs generated outside the region as a result of the growing, harvest, haulage or initial processing of products from plantations located in the South West Slopes Forestry Hub region. A further 5,161 flow-on or indirect jobs were generated as a result of (i) the demand created by the plantation industry for supplies and inputs such as fuel and mechanical servicing, and (ii) spending of salaries and wages by workers. This high number of flow-on jobs is predominantly due to the presence of the large wood and paper manufacturing sector in the region, which generates substantial flow-on effects. A total of 7,799 jobs were therefore supported by the operations of the softwood industry in the South West Slopes Forestry Hub region as of February 2017 (Appendix 1).

Employment by industry sector – February 2017

Of the 2,638 direct jobs, 16% were generated at the 'growing' stage (in the establishment and management of growing plantations), predominantly in nurseries, silvicultural contracting firms and forest management companies (Table 4). A further 21% was generated by the harvesting of plantations and the transport of logs to processing facilities: this was generated in harvest and haulage companies based within the region. The majority of the direct industry employment – 63% - was generated by the processing of logs into a wide range of products in the multiple wood and paper processors located in the region.

Table 4 Employment generated by the South West Slopes Forestry Hub plantation industry, February 2017, by industry sector

Industry sector	Employment generated in South West Slopes Forestry Hub region (persons)	Employment generated outside South West Slopes Forestry hub region (persons)	TOTAL employment generated by South West Slopes Forestry Hub region softwood plantations
Growers (forest management companies)[1]	143	12	155
Nurseries, silvicultural & roading contracting businesses	198	42	240
Harvest & haulage contracting businesses	522	22	544
Primary processing[2]	1597	66	1663
Other (including consultants, equipment sales, training)2	27	9	36
TOTAL	**2487**	**151**	**2638**

[1]Data includes some jobs in nursery sector where a grower had an integrated nursery operation
[2]The jobs generated in these sectors includes people involved in wholesaling of products produced by these processors.

The flow-on employment generated by the softwood plantation industry includes a wide range of jobs. Economic modelling using the BDO EconSearch RISE model identified employment multipliers generated by the industry, shown in Table 5. These show that for every direct job generated by the industry in the South West Slopes Forestry Hub region, a total of 2.9 jobs were created through a combination of production-induced and consumption-induced effects (see Appendix 1). This means that a total of 7,067 jobs within the South West Slopes Forestry Hub region are directly or indirectly dependent on the softwood plantation industry, and a total of 7,799 jobs are dependent on the softwood plantation industry in the South West Slopes Forestry Hub region (includes those living outside of the region) (Table 6).

Table 5 Employment multipliers: indirect employment generated by the South West Slopes plantation industry

Type of multiplier	Description	Multiplier estimate	Total employment
None	Direct jobs in SWS only	1.0	2,487
Type I	Direct jobs + production-induced jobs	2.0	4,925
Type II	Direct jobs + production-induced jobs + consumption-induced jobs	2.8	7,067

Table 6 Direct and flow-on employment generated by the South West Slopes plantation industry, by sector

	Growers (forest manage-ment companies)	Primary wood and paper processing	Harvest & haulage contracting businesses	Other (including consultants, equipment sales, training)	Nurseries, silvicultural & roading contracting businesses	Whole industry
Direct employment	155	1,663	544	36	240	2,638
Production-induced employment	138	2,051	340	16	75	2,621
Consumption-induced employment	175	1,886	371	17	91	2,540
Total employment (direct and flow-on)	**468**	**5,600**	**1,255**	**68**	**407**	**7,799**

Employment by local government area – February 2017

Table 7 shows the direct employment generated in different local government areas (LGAs) within the South West Slopes Forestry Hub region by the softwood plantations located within the region. It also shows the number of jobs generated in LGAs neighbouring the region, and in regions located further away. These numbers are based on the worker's place of residence – in other words, it shows where workers live. This has been done rather than showing jobs based on where a person works, as much of the spending and social activity undertaken by workers typically occurs near their residence, rather than near their workplace.

The largest number of jobs were located in Tumut, with 836 jobs directly dependent on the softwood plantation industry, a result of both a large number of jobs in primary wood and paper processing and many forest management and harvest and haulage workers being based in Tumut. This was followed by Alpine Shire Council in Victoria, with 361 jobs, and Tumbarumba, with 239 jobs. A total of 235 workers lived in the Benalla Rural City council, 229 workers lived in the Albury area and 175 workers lived in Wagga Wagga LGA. These figures were collected before the opening of XLam in Wodonga, and after the closure of the Norske Skog mill in Albury, and as such the number of jobs is likely to have changed somewhat in Albury-Wodonga since this time.

Table 7 Direct employment generated by the South West Slopes Forestry Forestry Hub plantation industry, Feb 2017, by local government area

Local government area name (2017)	Employed in establishing and managing plantations to point of harvest *(nurseries, managers, silvicultural contractors)*	Employed in harvest & haulage contracting	Employed in wood or paper processing	Total number of people directly employed in the SWS plantation industry	Total size of workforce (ABS 2016)	% total labour force employed in the softwood plantation industry (ABS 2016)
City of Albury	3	29	197	229	22,901	1%
City of Wagga Wagga	1	14	160	175	29,834	1%
Greater Hume Shire	12	10	19	41	4,610	1%
Cootamundra-Gundagai Regional Council	5	7	5	17	4,376	0.4%
Snowy Valleys Council (Tumbarumba)	26	59	154	239		
Snowy Valleys Council (Tumut)	157	133	546	836	5,990	18%
Nearby NSW LGAs/regions (Yass, ACT)	29	12	11	52	Not analysed	
Strathbogie Shire Council	5	0	4	9	4372	0.2%
Benalla Rural City Council	19	32	184	235	5659	4%
Wangaratta Rural City Council	22	25	93	140	12621	1%
Indigo Shire Council	0	19	10	29	7488	0%
Wodonga Council	8	53	40[1]	101	18197	1%
Towong Shire Council	26	37	0	63	2670	2%
Alpine Shire Council	72	104	185	361	5491	7%
Mansfield Shire Council	10	0	0	10	3782	0%
Other Victoria	16	10	54	80	Not analysed	
Employment located in other regions (predominantly 'travelling' or non-local workers associated with planting crews)	21	0	0	21	Not analysed	
TOTAL	**432**	**544**	**1662**	**2638**	127,991 (SWS region only)	2% (SWS region only)

[1] Employment in the processing sector for Wodonga is associated with the Norske Skog mill, which has closed down since 2017 when these estimates were obtained

Conclusions

A total of 2,638 jobs were directly dependent on the softwood plantations located in the South West Slopes Forestry Hub region as of February 2017, and when flow-on jobs were included, this increased to a total of 7,799 jobs directly or indirectly dependent on the softwood plantation industry in the region. This included jobs in businesses ranging from:

- nurseries growing seedlings
- silvicultural contractors preparing land for planting
- harvest and haulage of logs for processors
- processing of logs and residues into wood and paper products.

Most of these jobs (94%) were located within the region, largely due to the establishment of multiple primary wood and paper processing facilities in the region. Of the 2,638 direct jobs, 16% were generated at the 'growing' stage (in the establishment and management of growing plantations), predominantly in nurseries, silvicultural contracting firms and forest management companies. A further 21% were generated by the harvesting of plantations and the transport of logs to processing facilities. The majority of the direct industry employment – 63% - was generated by the processing of logs into a wide range of products by the various wood and paper processors located in the region.

The largest number of jobs were located in Tumut NSW, with 836 jobs directly dependent on the softwood plantation industry, followed by Alpine in Victoria, with 361 jobs, and Tumbarumba NSW, with 239 jobs.

5. Industry skills and training needs

Ongoing investment in new technology and business processes at all stages of the supply chain, together with a large workforce, means the South West Slopes Forestry Hub softwood plantation industry has a need for ongoing training of existing workers, and for recruitment of skilled workers. The region has a dedicated forestry training facility, the Forest Industry Training Centre, based in Tumut at the Riverina Institute of TAFE. This facility provides training in a wide range of skills needed by the diverse workforce of the softwood plantation industry in the region, with training being provided at a range of sites and workplaces to suit industry needs.

This chapter examines the workforce needs of the softwood plantation based industry in the South West Slopes Forestry Hub region, focusing on skills and training needs in the industry. First, a summary of the key skills needs in the industry is provided, together with analysis of how these needs are evolving based on examination of changes over time in worker occupations within the industry. Second, the skills and training needs identified by businesses in the region are examined, including how businesses are currently sourcing training for their workers. A brief overview of formal skills attainment in the industry, and how this is changing, is then provided. Finally, key worker recruitment and retention challenges identified by businesses in the region are analysed. Some implications of these findings for skills and training needs of the local workforce are then discussed.

Industry skills needs

The softwood plantation industry needs workers with a diverse range of skills. Forestry businesses across Australia were asked to provide information about the skills they needed in their workforce, with 21 forestry businesses providing verbal feedback on these needs via phone conversations as part of the survey process[1]. Most who discussed skills needs focused on the areas where they were having difficulty recruiting, which were:

- **Information and communication technology (ICT) skills**. These were particularly needed for managers, administrative staff, and increasingly for machinery and plant operators. This need was identified across all types of businesses.
- **Specialist professionals**: Challenges recruiting specialist professionals in the areas of horticulture (including nursery expertise), mechanics, engineering (including physical and chemical engineering), and finance were reported by a diversity of businesses. While the particular specialties varied, there was commonality in challenges reported being focused on people with specialist skills.
- **Mechanics**: Some harvest and haulage and processing businesses reported difficulty accessing adequate skilled mechanics to service their specialised vehicles and machinery
- **Middle managers**: Some reported finding it difficult to recruit locally-based middle managers with adequate experience and ability to act as managers
- **Skilled drivers:** Some harvest and haulage companies identified that they found it increasingly difficult to recruit skilled truck drivers, and were having to invest increasing amounts in skilling up relatively inexperienced drivers in order to maintain their workforce.

[1] Other businesses did not identify specific skills needs when asked via phone, so have not been included in this number.

More specifically in the South West Slopes Forestry Hub region, three businesses commented about difficulty recruiting specialist professionals, skilled drivers and middle managers.

Skills and training needs

After identifying general skills needs, businesses were asked to answer a series of survey questions regarding the specific skills sets required by some or all of their workforce, and for those businesses that identified a need for a skill set, whether they required workers to have formal accreditation in these skills, and how they currently provided training. These questions were answered by all but one plantation grower (and includes one plantation managing consultant), 40% of processors and 20% of harvest and haulage contractors. Only two silvicultural contractors answered these questions[2].

First, businesses were asked whether any of their workers (i) needed skills in and (ii) if they required the skills, whether they were required to have formal accreditation in, any of the following areas:

- Chainsaw and other hand-held machinery (eg brushcutter, pruning)
- Heavy machinery operation
- Fire fighting
- Occupational health and safety training.
- Compliance training e.g. training in compliance needed for regulatory or certification bodies
- IT/ software training specialised to the industry e.g. for plant operation, in-field survey
- Business and financial management
- Road transport/driver training for haulage drivers
- Community relations/community engagement
- Forest ecology and silviculture including plant identification
- Forest operations planning and management
- Marketing/sales

Table 8 shows the proportion of businesses reporting that some or all of their workers required skills in each area of competency, and the proportion those who identified a need for these skills that also required formal accreditation of these skills.

Businesses most commonly reported needing workers with general skills that are relevant to many types of businesses: occupational health and safety training, and business and financial management, with 100% of businesses needing skills in OHS training and 94% of businesses reporting a need for skilled workers in business and financial management, with most businesses requiring some kind of formal accreditation of staff in these areas.

The next most common skills needed by businesses were heavy machinery operating skills, chainsaw operation, compliance training (eg training in meeting compliance standards of regulatory or certification authorities), and fire fighting, required by 82% of businesses, with formal accreditation required by 67% to 100%.

[2] Most silvicultural contractors completed a shorter survey form after reporting having limited time and electing to provide verbal feedback on their skills and training needs, which was reported in the previous section.

Table 8 Skills and accreditation needs reported by softwood plantation businesses in the South West Slopes Forestry Hub region

	All businesses (includes silvicultural contractors)		**Growers**		**Harvest and haulage contractors**		**Processors**	
	Need skills	Require accred-itation[1]	Need skills	Require accred-itation[1]	Need skills	Require accred-itation[1]	Need skills	Require accred-itation[1]
Occupational health and safety training	100%	71%	100%	50%	100%	100%	100%	83%
Business and financial management	94%	75%	83%	40%	100%	100%	100%	100%
Heavy machinery operation	82%	79%	50%	100%	100%	100%	100%	67%
Chainsaw and other hand-held machinery	88%	87%	100%	100%	100%	100%	67%	75%
Compliance training	82%	79%	83%	60%	67%	100%	100%	83%
Fire fighting	82%	79%	100%	83%	67%	50%	83%	80%
IT/ software training specialised to the industry	76%	46%	100%	17%	100%	67%	67%	75%
Marketing/sales	71%	33%	83%	0%	67%	50%	67%	75%
Forest operations planning and management	53%	89%	83%	80%	100%	100%	17%	100%
Community relations/ engagement	53%	44%	83%	20%	33%	100%	50%	67%
Forest ecology and silviculture	53%	78%	100%	67%	67%	100%	17%	100%
Road transport/driver training for haulage drivers	47%	88%	33%	50%	67%	100%	50%	100%

[1] Proportion of businesses who identified requiring these skills

Businesses were also asked to identify how they currently provided training in each of the skills areas in which they identified having needs, selecting from the following options:

- In-house training provided by other staff, not accredited
- In-house training by experts hired by the business
- Accredited courses with registered training organisations.

Table 9 shows the proportion of businesses who deliver skills training in different competency areas via in-house training by other staff, in-house training by an expert, or training via a registered training organisation:

- Registered training organisations were most commonly used to provide training in forest operations planning and management, machinery operation, occupational health and safety, road transport and driver training and business and financial management, being used by 75% or more of all businesses who required these skills. In some cases this was supplemented by in-house training

- Registered training organisations were also the most common methods for training in heavy machinery operation and fire fighting, although less than 70% of businesses used this formal training and around one-third opted for in-house training by other staff
- Compliance training was delivered through an RTO for half of the businesses, and as in-house training by other staff in the other half, suggesting opportunities for additional provision of training in this area through more formal mechanisms
- Forest ecology and silvicultural was similarly sometimes delivered through an RTO and sometimes through in-house training by other staff
- In-house training was more common than use of a registered training organisations for marketing/sales, IT/software training, and community relations/engagement.

Table 9 Types of training used to build staff skills in the South West Slopes Forestry Hub region

	Registered training organisation	In-house training by other staff	In-house training by expert
Forest operations planning and management	89%	33%	11%
Chainsaw and other hand-held machinery (eg brushcutter, pruning)	80%	20%	0%
Occupational health and safety training	76%	41%	18%
Road transport/driver training for haulage drivers	75%	25%	0%
Business and financial management	75%	38%	19%
Heavy machinery operation	57%	36%	14%
Fire fighting	57%	36%	7%
Compliance training	57%	64%	21%
Forest ecology and silviculture including plant identification	44%	56%	11%
IT/ software training specialised to the industry	31%	38%	23%
Marketing/sales	25%	50%	17%
Community relations/ engagement	22%	44%	33%

Recruiting workers and contractors

In addition to identifying the types of skills required in the workforce and the methods used to build competencies via training and formal qualifications, businesses were asked how easy or difficult they found it to recruit workers and contractors. They were then asked what factors contributed to difficulty recruiting workers.

As shown in Figure 2, the types of staff that were most challenging to recruit were managers and high level professional staff, with 79% of businesses reporting difficulty recruiting these types of workers. This was followed by finance managers, with 55% finding it difficult to recruit staff. Fifty per cent found it challenging to source heavy machinery operators, and only 8% found this easy. Recruiting field staff and drivers was somewhat easier, although 43% and 40% respectively still found this difficult. Most businesses found it relatively easy to source administrative workers.

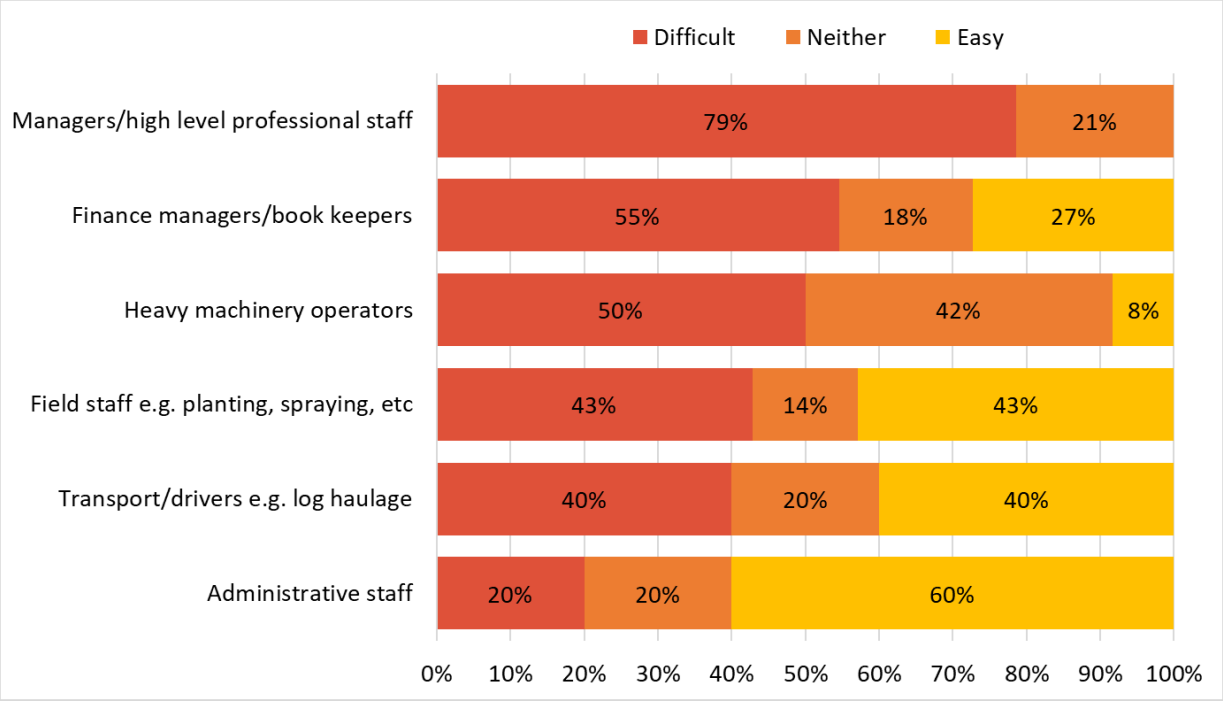

Figure 2 Level of difficulty involved in recruiting different types of workers, as rated by softwood industry businesses in the South West Slopes Forestry Hub region

When plantation managers were asked about accessing skilled contractors, skilled harvest and haulage contractors and site preparation and planting contractors were reported as most difficult to source. Nurseries to supply seedlings or seed, and skilled silvicultural contractors who undertake spraying and fertilising were less difficult to source, and skilled roading and earthmoving contractors and silvicultural contractors who undertake coppicing or pruning were not reported as being difficult to source. (Figure 3).

When asked what factors made it difficult to recruit staff, a lack of available workers with appropriate skills was the top issue identified by businesses, with 94% reporting that this was a big issue for them (Figure 4). For 82%, the investment and time required to build workforce skills was a big issue, while 69% reported workers don't want to shift to the community where their business is based. In many cases (63% of businesses), a lack of jobs for partners or spouses was reported as a factor making it difficult to recruit staff.

Over half (59%) of businesses reported that skills obtained in other industries were not easily transferable to the softwood industry, reducing the ability of businesses to recruit workers from other industries, and that there is a lack of suitable workers available in the community. A large proportion of businesses (76%) also reported that negative perceptions of the industry was a moderate of big issue for recruitment, with only 24% reporting this as not an issue or a low issue.

Less than 45% of businesses reported that competition from other industries on wages or working conditions, or lack of affordable accommodation, were big issues for recruitment.

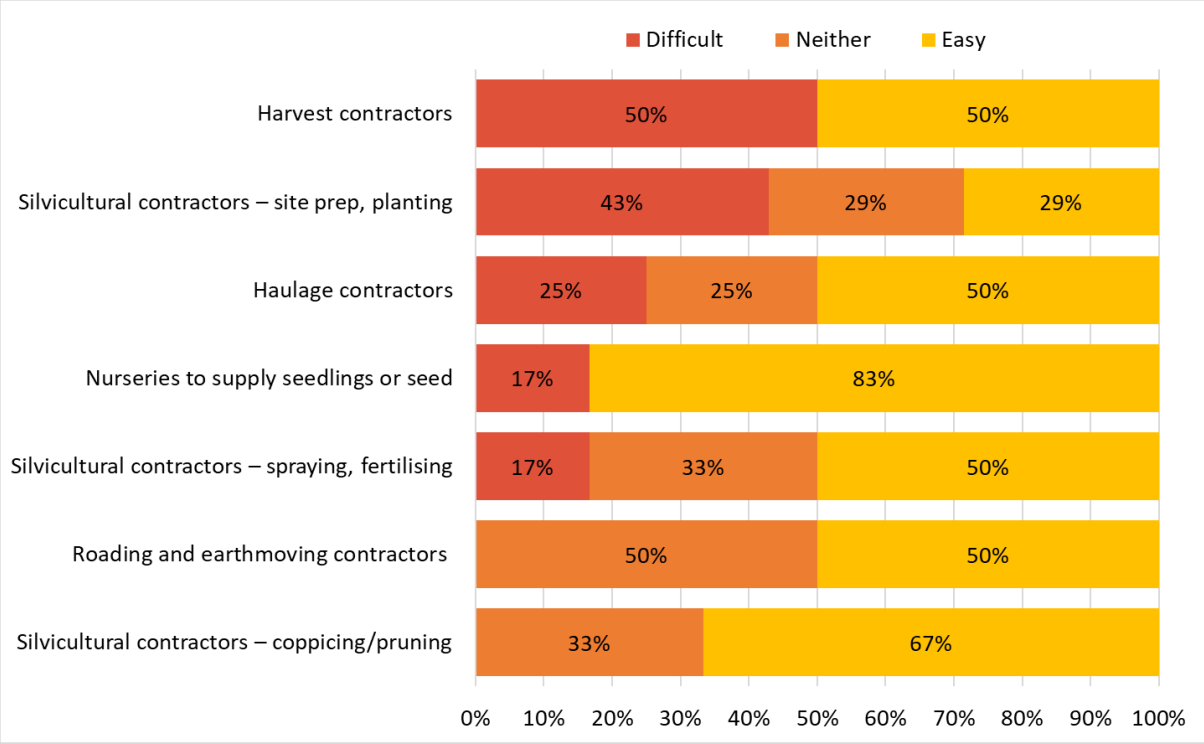

Figure 3 Level of difficulty involved in recruiting different types of contractors, as rated by businesses involved in engaging contractors in the South West Slopes Forestry Hub region

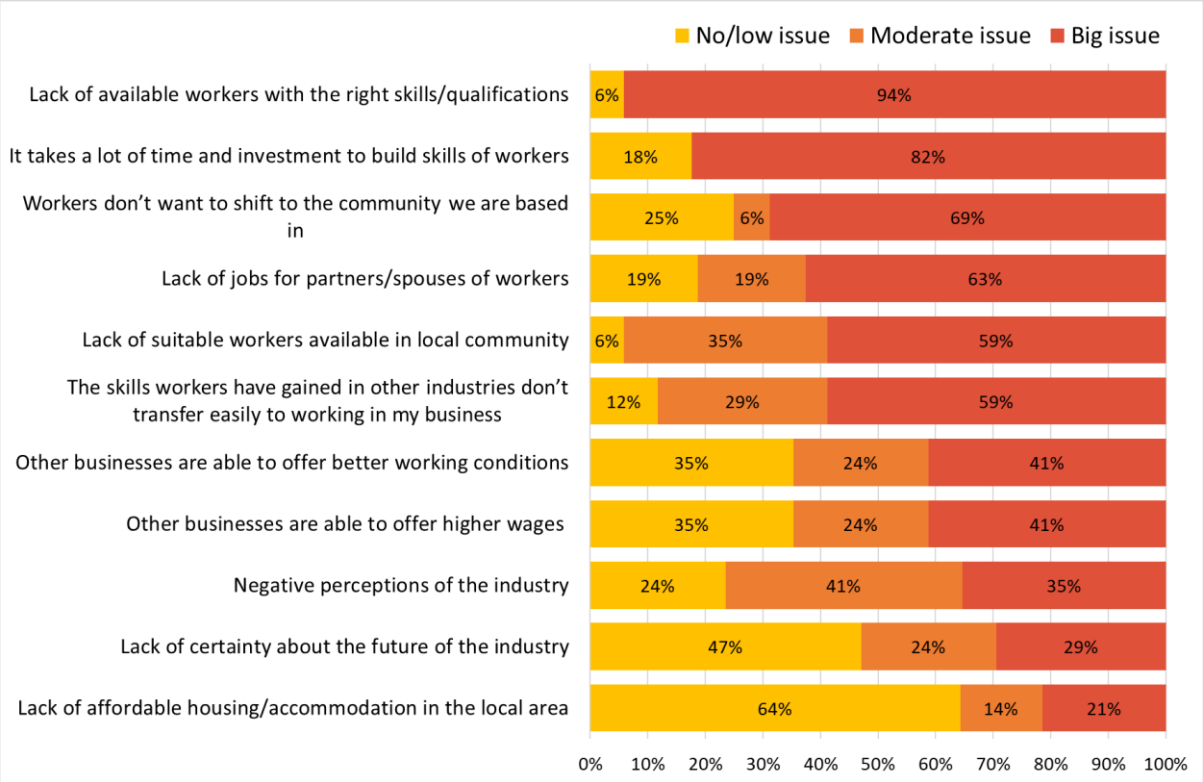

Figure 4 Key issues preventing recruitment of skilled workers into the softwood industry in the South West Slopes Forestry Hub region

Conclusions

As the softwood industry evolves, there is growing demand for workers with specialised skills, including specialist engineers, scientists and mechanics. More generally there is increasing demand for skilled mobile and fixed plant operators. Demand for less skilled factory process operators is declining. A need to have a skilled haulage workforce and to have workers with high level finance, middle management and ICT skills remains strong, with ICT skills needs occurring across most occupations within the industry.

Businesses commonly reported needing workers with general skills that are relevant to many types of businesses: occupational health and safety training, and business and financial management, with most businesses requiring formal accreditation of staff in these areas. Registered training organisations were commonly used by businesses to provide training in forest operations planning and management, machinery operation, occupational health and safety, road transport and driver training and business and financial management.

Recruiting skilled managers and professional staff, finance managers and heavy machinery operators is difficult for many businesses in the region, suggesting a critical need to address the challenges that are causing a lack of skilled staff. These challenges include a lack of suitably skilled local workers, the high cost of in-house training of staff, and difficulty attracting skilled workers from elsewhere to live in the region.

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Appendix 1 Study methods

This Appendix describes the methods used to collect and analyse data in the study, focusing on the three key methods used:

- Survey of the South West Slopes Forest Hub softwood plantation industry (SE NSW and NE Vic)
- Analysis of data from the Australian Bureau of Statistics
- Economic modelling.

Industry survey

Questionnaire design

The content of the questionnaire was designed after consultation with (i) members of the industry located in the region and (ii) forest industry stakeholders Australia wide. Consultation with local industry representatives ensured the questions were designed to be relevant to the South West Slopes, and included consultation with staff involved in skills and training provision for forest industry workers, plantation management, wood and paper manufacturing. Consultation with stakeholders across Australia included consultation with staff employed in forest policy, skills and training for forestry workers, economic analysis of the industry, and industry reporting and certification. In total, 21 people were consulted in the process of developing the questionnaire and asked to comment on the draft questionnaire.

Based on consultation with these people, the questionnaire included questions on the following topics:

- Dependence on native forest, softwood plantations, hardwood plantations and other sources of fibre. This enables identification of the amount of employment and economic activity generated by each of these sectors
- Employment by local government area. This enables identification of how much the economy of different LGAs depends on the forest industry
- Key business activities including area of forest/plantation managed, harvested, hauled, and volume of wood and fibre inputs and outputs. This enables analysis of different sectors of the industry
- Supply chain linkages, with businesses asked to identify their key suppliers and customers. This enables spatial tracing of the flow of wood and paper products
- Skills, training and worker recruitment needs, with a detailed set of questions asked on this about the key areas in which businesses have unmet skills needs and difficulty recruiting workers
- Business and market outlook, including plans for investment or downsizing, to identify the overall likely near-term future for the industry
- Forest certification, including views about the benefits and costs of market certification processes.

The survey did not include questions about some topics that initial consultation identified were difficult for most businesses to answer. This included asking about the formal educational qualifications held by workers, with many businesses reporting they do not have extensive records

of this, and about many demographic characteristics of the workforce, again because many businesses do not have record keeping identifying these characteristics.

Survey scope

To produce robust and up-to-date data on employment, skills and training needs and economic value of the industry, all businesses involved in the growing, managing, harvesting, transporting or processing of commercial wood or paper products in the region were asked to take part in the survey. The survey was designed to capture all initial processing of logs into wood and paper products, as well as processing of log residues produced as part of one manufacturing process into wood or paper products. It did not include jobs dependent on native forests or on already manufactured wood or paper products imported from other regions into the South West Slopes. Appendix 2 further discusses the scope of the definition of the forest industry used in the report.

Sampling

A total of 74 businesses were identified as operating in the South West Slopes Forestry Hub region (SE NSW and NE Vic) or utilising logs produced from plantations in this region, in the following business categories:

- Plantation management agencies/businesses
- Nurseries
- Silvicultural contractors
- Harvest and haulage contractors
- Wood and paper processors
- Other businesses, including sales, consultants and training.

Of these businesses:

- 12 were large businesses employing 100 or more workers. 7 large businesses completed the survey
- 8 were medium sized businesses employing 20-99 workers. Of these, 5 completed the survey and 2 provided basic information by phone but did not complete all survey questions
- 15 were small-medium businesses employing 10-19 workers. Of these, 5 completed the full survey, 4 completed a smaller number of questions by phone, and 6 did not participate in the survey
- The remainder (39 businesses) were small businesses employing less than 10 workers. Of these, 3 completed the survey, 6 completed a small number of questions by phone, and 30 did not participate in the survey.

In total, 16% of businesses completed the full survey and 43% completed the core questions on the survey.

Analysis

Survey data were analysed using Microsoft Excel. A key part of the analysis process was using available data to impute employment and expenditure data for those businesses who did not participate in the survey.

To ensure employment and expenditure estimates could be accurately imputed for those businesses who did not participate in the survey, we prioritised surveying those businesses who answers could enable estimation of economic activity in businesses that did not participate in the survey. In particular, the survey was designed to capture data enabling estimation of employment in the contracting sector, as contracting businesses were least likely to take part in the survey. Plantation managers were asked to identify their level of spending on silvicultural, harvest and haulage contracting. Plantation managers and others with expertise in the contracting sector were also asked to provide information on the size of different contracting businesses. These data were used to impute employment and expenditure estimates for the contracting businesses who did not complete these questions on the survey.

Economic modelling

The estimates of regional economic contribution presented in this report use a model known as the RISE model (Regional Industry Structure and Employment).

The RISE model has input-output analysis as its core. Input-output models provide a detailed picture of the structure of an economy at a particular point in time. The model provides a basis for analysis of inter-sectoral relationships within the economy. Accordingly, this makes the model ideal for regional impact and regional contributions analysis.

The RISE model format was originally developed by BDO EconSearch Pty Ltd as a user-friendly Excel based tool for use by regional development analysts in South Australia. BDO EconSearch was contracted to develop a set of easy to use regional impact models that could be assist regional planning at both a state and regional level.

The first set of South Australian models were commissioned by the Regional Communities Consultative Council in 2004. They were updated in 2007 for the SA Department of Trade and Economic Development, and updated again in 2010, 2013 and annually since for the SA Department of Premier and Cabinet.

BDO EconSearch also developed a set of RISE models at the local government area (non-metropolitan) and regional level for the Victorian Department of Primary Industries in 2010. These models were updated in 2013 for the Department of Environment and Primary Industries.

BDO EconSearch has also developed many one-off, single region RISE models for a range of socio-economic impact analysis projects throughout Australia including several in NSW. RISE models of the South West Slopes and NSW in 2015-16 were constructed for this project to assess the economic contribution of the forestry industry in the South West Slopes region and at state level.

The South West Slopes Forestry Hub region model consists of the local government areas of the City of Albury, City of Wagga Wagga, Greater Hume Shire, Gundagai Shire Council, the Snowy Valleys Council (amalgamated from the former Shires of Tumut and Tumbarumba) in NSW, and Alpine Shire Council, Benalla Rural City Council, Indigo Shire Council, Mansfield Shire Council, Strathbogie Shire Council, Towong Shire Council, Wangaratta Rural City Council and Wodonga Council in Victoria.

RISE Model Extensions

The RISE model can be distinguished from the standard input-output model through a number of features or add-ons that allow for more realistic assessments of regional economic impacts. These include the following:

Price Response Model - One of the key limitations of a standard input-output model is its lack of flexibility to take into account different scenarios of market response and regional adjustment for impact analysis. The price sensitive RISE model is a development of the conventional input-output model which provides for non-linearity in production in both primary and intermediate inputs. The model extension delivers results (e.g. multipliers and simulated impacts) that are more closely aligned with CGE modelling yet with greater rigour and credibility for analysis at a local scale.

Demographic Economic Model - The RISE model has also been extended as demographic-economic (DECON) models. The two key characteristics of the DECON model, when compared with a standard economic model, are as follows.

1. The introduction of a population 'sector' (or row and column in the model) makes it possible to estimate the impact on local population levels of employment growth or decline.
2. The introduction of an unemployed 'sector' makes it possible to account for the consumption-induced impact of the unemployed in response to economic growth or decline.

Tourism Satellite Accounts – The tourism industry is not defined as a separate industry in the standard industry classification system used by ABS and others. The ABS has developed a set of "satellite accounts" at the national level and a process that can be adopted at the regional level to better define the tourism industry. This process has been adopted in the RISE model so that tourism industry impacts can be directly assessed.

Overview of economic concepts

Economic activity indicators: the primary focus of this report is the generation of economic activity resulting from the forestry industry. The key economic activity indicators considered in the analysis are gross regional product (GRP) and employment.

Gross regional product (GRP): is a measure of the contribution of an activity to the regional economy. The direct GRP of an industry is measured as value of gross output (business revenue) less the cost of goods and services (including imports) used in producing the output. In other words, it can be measured as the sum of wages and profits. It represents payments to the primary inputs of production (labour, capital and land). Using GRP as a measure of economic impact avoids the problem of double counting that may arise from using value of output for this purpose.

FTE: is an indicator of employment and measures a worker's involvement in a project or industry activity. An FTE of 1.0 means that the person is equivalent to a full-time worker, while an FTE of 0.5 signals that the worker is only half-time.

Categories of economic activity in the forestry supply chain

A useful way to think about economic activity and economic impact (as measured by GRP and employment) is to refer to the supply chain (Figure A1.1).

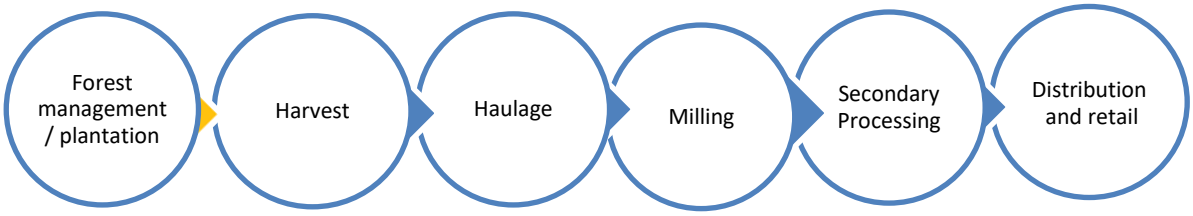

Figure A1.1 Forestry industry supply chain

Broadly speaking, each economic indicator has four levels of economic impact across the economy. For example, with respect to employment:

1. Direct employment – this is employment in those firms, businesses and organisations that are directly engaged in forestry activity. In this study this includes:
    a. Plantation/ Forest management
    b. Harvesting & haulage
    c. Paper production and sawmilling
2. First round employment – refers to employment in firms that supply inputs and services to the 'direct employment' businesses, i.e. those categorised under #1 above.
    a. Forestry-input sectors including all inputs used by forestry such as fuel, electricity, water and chemicals
    b. Forestry service sectors
    c. Packaging for timber processing
    d. Business support services
    e. Other inputs.
3. *Industrial-support employment* – is the term applied to 'second and subsequent round' effects as successive waves of output increases occur in the economy to provide industrial support, as a response to the original forestry industry expenditure, i.e. the activity in sectors that provide goods and services to those businesses that supply directly to the forestry industry. This category excludes any employment associated with increased household consumption.
4. *Consumption-induced employment* – is the term applied to those effects induced by increased household income associated with the original forestry industry expenditure. The expenditure of household income associated with all three categories of employment (direct, first round and industrial-support) will generate economic activity that will in itself generate jobs.

In this report we use the terms 'direct', 'production-induced', 'consumption-induced', 'flow-on' and 'total' to describe the economic impacts across the economy:

- 'production-induced' = the combination of the first round impact and the industrial support impact (2+3)
- 'consumption-induced' = the consumption-induced impact (4)
- 'flow-on' = the combination of the consumption-induced and production-induced economic impacts (2+3+4)

- ‘total’ = the combination of all the economic impacts in the economy, i.e. the combination of the direct and flow-on economic impacts (1+2+3+4)

These categories are illustrated in Figure .

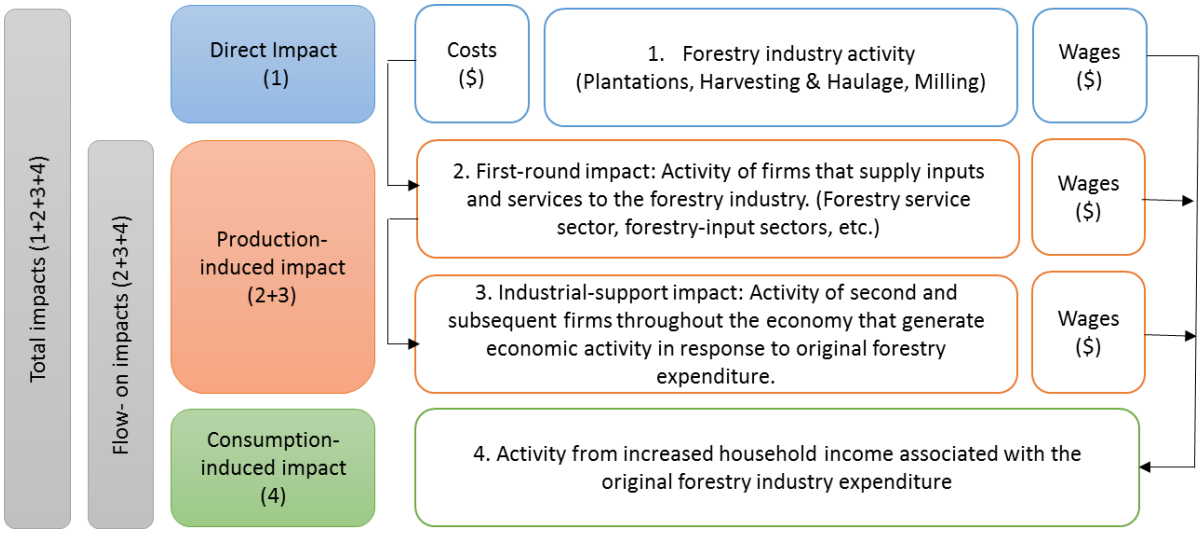

Figure A1.2 Levels of economic impact across the economy

The direct, flow-on and total economic contributions (GRP and employment) are provided for 5 sectors of the forestry industry and the industry as whole:

1. Growers (forest management companies)
2. Harvest & haulage contracting businesses
3. Wood and paper processing
4. Other (including consultants, equipment sales, training)
5. Nurseries, silvicultural & roading contracting businesses
6. Whole Industry (excludes transfers)

Limitations

The economic consequence of the presence of the forestry industry will be felt in many aspects of activity in the regions, ranging from levels of regional output, income and employment, to land prices (including residential, commercial and industrial land), house and building prices, local government rates, supply and demand of labour, demand and supply of urban infrastructure and so on. Unfortunately, fully comprehensive models that include all aspects of regional economic activity and economic phenomena have not been satisfactorily developed for impact analysis at a regional level in Australia.

Results

Table A1.1 Economic impacts of the South West Slopes Forestry Hub plantation industry, by sector, on the South West Slopes Forestry Hub region, on New South Wales and Victoria, and on Australia

	Growers (forest management companies)	Wood and paper processing	Harvest & haulage contracting businesses	Other (including consultants, equipment sales, training)	Nurseries, silvicultural & roading contracting businesses	Whole Industry (excludes transfers)
South West Slopes						
Output ($m)	**369.5**	**2,347.4**	**275.5**	**8.8**	**60.7**	**2,579.7**
Direct ($m)	305.3	1,293.2	127.7	4.0	29.1	1,277.1
Production-induced ($m)	29.4	650.0	74.6	2.3	15.8	772.2
Consumption-induced ($m)	34.8	404.1	73.1	2.6	15.8	530.5
GRP ($m)	**144.9**	**873.7**	**114.0**	**4.2**	**26.2**	**1,163.0**
Direct ($m)	112.7	374.4	40.4	1.6	10.4	539.5
Production-induced ($m)	13.2	278.7	33.6	1.1	7.2	333.8
Consumption-induced ($m)	19.0	220.7	40.0	1.4	8.7	289.7
Household Income ($m)	**36.1**	**426.9**	**76.6**	**2.7**	**16.5**	**558.8**
Direct ($m)	17.7	151.9	33.5	1.2	7.3	211.5
Production-induced ($m)	9.0	166.7	23.3	0.8	5.0	204.8
Consumption-induced ($m)	9.4	108.4	19.7	0.7	4.3	142.5
Employment (total)	**401**	**5,182**	**1,115**	**47**	**323**	**7,067**
Direct (total)	143	1,597	522	27	198	2,487
Production-induced (total)	116	1,954	297	10	61	2,438
Consumption-induced (total)	141	1,630	296	10	64	2,143
New South Wales						
Output ($m)	**400.2**	**2,455.7**	**315.9**	**13.3**	**75.6**	**2,778.3**
Direct ($m)	315.4	1,320.3	131.8	5.0	32.8	1,323.0
Production-induced ($m)	40.9	660.7	94.1	4.1	20.5	820.4
Consumption-induced ($m)	43.9	474.6	89.9	4.1	22.3	634.9
GRP ($m)	**164.1**	**993.7**	**134.8**	**6.5**	**34.4**	**1,333.5**
Direct ($m)	121.7	424.6	43.0	2.1	12.7	604.1
Production-induced ($m)	18.0	306.0	42.4	2.1	9.4	377.9
Consumption-induced ($m)	24.4	263.2	49.4	2.3	12.3	351.5
Household Income ($m)	**43.2**	**473.4**	**86.9**	**4.1**	**21.5**	**629.1**
Direct ($m)	19.5	157.4	34.9	1.5	9.1	222.3
Production-induced ($m)	11.7	187.0	27.6	1.5	6.4	234.1
Consumption-induced ($m)	12.0	128.9	24.5	1.1	6.1	172.7
Employment (total)	**468**	**5,600**	**1,255**	**68**	**407**	**7,799**
Direct (total)	155	1,663	544	36	240	2,638
Production-induced (total)	138	2,051	340	16	75	2,621
Consumption-induced (total)	175	1,886	371	17	91	2,540
Australia						
Output ($m)	**427.3**	**2,927.2**	**383.0**	**15.7**	**89.9**	**3,360.9**
Direct ($m)	315.4	1,320.3	131.8	5.0	32.8	1,323.0

	Growers (forest management companies)	Wood and paper processing	Harvest & haulage contracting businesses	Other (including consultants, equipment sales, training)	Nurseries, silvicultural & roading contracting businesses	Whole Industry (excludes transfers)
Production-induced ($m)	52.4	941.7	129.0	5.1	27.3	1,155.5
Consumption-induced ($m)	59.6	665.2	122.2	5.6	29.8	882.4
GRP ($m)	**177.9**	**1,179.4**	**168.3**	**7.7**	**41.7**	**1,575.0**
Direct ($m)	121.4	387.3	42.0	2.0	12.6	565.4
Production-induced ($m)	24.0	429.0	59.5	2.6	12.8	527.9
Consumption-induced ($m)	32.6	363.0	66.7	3.0	16.3	481.6
Household Income ($m)	**50.3**	**569.9**	**104.1**	**4.7**	**25.2**	**754.2**
Direct ($m)	19.5	157.4	34.9	1.5	9.1	222.3
Production-induced ($m)	14.9	236.9	36.8	1.8	8.2	298.6
Consumption-induced ($m)	15.9	175.5	32.4	1.5	7.9	233.3
Employment (total)	**529**	**6,339**	**1,370**	**73**	**432**	**8,742**
Direct (total)	155	1,663	544	36	240	2,638
Production-induced (total)	159	2,309	390	17	85	2,961
Consumption-induced (total)	214	2,367	436	20	107	3,144